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Simplify

SilverStorm 9000
Hardware Installation Guide

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Section 1

Introduction

This manual describes the hardware installation and initial configuration tasks for the SilverStorm™ 9000 series that includes:

- The SilverStorm 9024 24-port InfiniBand switch
- The SilverStorm Multi-Protocol Fabric Director (MPFD) series:
  - SilverStorm 9020
  - SilverStorm 9040
  - SilverStorm 9080
  - SilverStorm 9120
  - SilverStorm 9240

This manual is organized as follows:

Section 1 describes the intended audience and technical support.

Section 2 describes the hardware installation and initial configuration tasks.

Appendix A provides product specification information.

Appendix B provides product safety and regulatory information.

1.1 Intended Audience

This manual is intended to provide network administrators and other qualified personnel a reference for hardware installation and initial configuration for the switches.

1.2 License Agreements

Refer to the *QLogic Software End User License Agreement* for a complete listing of all license agreements affecting this product.

1.3 Technical Support

Customers should contact their authorized maintenance provider for technical support of their QLogic switch products. QLogic-direct customers may contact QLogic Technical Support; others will be redirected to their authorized maintenance provider.

Visit the QLogic support Web site listed in Contact Information for the latest firmware and software updates.

1.3.1 Availability

QLogic Technical Support for products under warranty is available during local standard working hours excluding QLogic Observed Holidays.

1.3.2
Contact Information

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Section 2

Installation

This section describes how to install and configure for first-time use:

- The SilverStorm 9000 switches in a network environment.

2.1 Planning the Installation

The 9000 is designed to be installed in an existing 19-inch equipment rack or server rack.

NOTE: These chassis are designed for a four-post server cabinet. They should not be mounted in a two-post telco cabinet.

Racks should conform to conventional standards. Use the American National Standards Institute (ANSI)/Electronic Industries Association (EIA) standard ANSI/EIA-310-D-92 and International Electrotechnical Commission (IEC) 297

Racks should meet the following mechanical recommendations:

- Four-post, 19" rack to facilitate easy maintenance
- Universal mounting rail hole pattern identified in IEC Standard 297
- Mounting holes flush with the rails to accommodate the chassis

NOTE: Operation is subject to the following condition:

Rack Enclosure Door Panels - This unit radiates radio frequency energy and was tested for FCC Part 15 compliance in a suitable rack enclosure, providing the means to confine radiated emissions. Construction of the rack enclosure may consist of mesh screen or perforations, and should include top, side, and front and rear door panels.

Use a rack grounding kit and a ground conductor that is carried back to earth or to another suitable building ground. Ground the equipment rack to earth ground.

Provide enough room to work on the equipment. Clear the work site of any unnecessary materials. Make sure the equipment will have enough clearance for front and rear access.

2.1.1
Cable Requirements

2.1.1.1
Cable Distances

When planning the location of the switches, consider the distance limitations for signaling, EMI, and connector compatibility. It is recommended that the user does not exceed specified transmission rate and distance limits.

NOTE: Building and electrical codes vary depending on the location. Comply with all code specifications when planning the site and installing cable.

When running cable to the equipment, consider the following:

- Do not run cables where they can be stepped on or rolled over.
- Be sure cables are intact with no cuts, bends, or nicks.
- If the user is making a cable, ensure that the cable is properly crimped.
- Provide proper strain relief for standard IB cables.
- Support cable using a cable manager mounted above connectors to avoid unnecessary weight on the cable bundles.
- Bundle cable using velcro straps to avoid injuring cables.
- Keep all ports and connectors free of dust.
- Untwisted Pair (UTP) cables can build up Electrostatic Discharge (ESD) charges when being pulled into a new installation. Before installing category 5 UTP cables, discharge ESD from the cable by plugging it into a port on a system that is not powered on.
- When required for safety and fire rating requirements, plenum-rated cable can be used. Check the local building codes to determine when it is appropriate to use plenum-rated cable, or refer to IEC standard 850.

2.1.1.2
Uninterruptible Power Supply

Consider the following when selecting Uninterruptible Power Supply (UPS) equipment:

- The minimum amperage requirements for a UPS:
  - Calculate VA (Volt-Amps): Locate the voltage and amperage requirements for each piece of equipment (usually located on a sticker on the back or bottom of the equipment). Multiply the numbers together to get VA.

- Add the VA from each piece of equipment together to find the total VA requirement. Then add 30% to determine the minimum amperage requirements for the UPS.

- Transition time (the time necessary for the UPS to transfer from utility power to full-load battery power).
- The longest potential time period the UPS might be required to supply backup power.
- Whether or not the UPS unit also provides online protection.

2.2 Installation Tasks Checklist

To perform the actual switch installation, the site implementation engineer must perform the following tasks, which are detailed in this section.

CAUTION! Be sure to review the safety information *before* starting the installation and *during* the installation process (refer to Appendix B).

1. Check the installation site to verify the installation of cabinet power feeds, rails, and grounding.
2. Unpack the equipment and inspect for any shipping damage. Any shipping damage should be reported to the shipping company.
3. Verify that the equipment shipped matches the packing list.
4. Mark the rack and install the mounting rails.
5. Physically install the switch in the rack.

2.2.1 Tools and Equipment Required

- An ESD wrist strap
- A #2 Phillips screwdriver
- Pen (felt-tip) to mark the mounting holes

2.2.2 Check the Installation Site

The switches are designed to be installed in an existing server cabinet (not a telco cabinet), where it can be mounted in a standard equipment rack.

Be sure of the following:

- The cabinet has a full earth ground to provide reliable grounding.
- There is enough room to work on the equipment.
- The equipment will have enough clearance for front and rear access.

- The IB cables can be accessed easily.
- Water or moisture cannot enter the switch.
- The ambient temperature stays between 50° - 113°F (5° - 45° C).
- Cabinet doors do not interfere with front-to-back air flow.

The cabinet should have its own switchable power distribution. If the switch has two power supplies, it is suggested that a cabinet with dual power distribution units is used.

It is recommended that cabinet anti-tip devices are used. This is especially true if installing or removing a switch in the upper half of the cabinet when the lower half is empty.

2.3 Installation Tasks

The following is an overview of the installation tasks detailed in this section:

1. If applicable, remove the doors of the rack.
2. Mark the rack, allowing the applicable amount of vertical space to install each switch.
3. Install the hat rail sections (9024, 9020 and 9040).
4. Install the bottom support rails (9024, 9020, 9040, 9080, 9120 and 9240).
5. Rack mount the switch.
6. Install the top support rails (9240).
7. If applicable, replace the rack's doors.

NOTE: The mounting kit hardware contains all of the necessary parts for installing and mounting the switches into a rack. These kits are intended for use in cabinets with a depth ranging from 28 - 34 inches. A support shelf capable of supporting the rated weight of the 9240 may be used in place of rails. For specific product weights refer to Table A-1 in Appendix A.

2.3.1 Mounting Hardware Kit Contents:

2.3.1.1 9024-FC

- **Kit Mounting Brackets** containing:
  - One pair (left and right) of rack mounting brackets
  - #6-32 flat head screws

- **Kit Mounting Hardware 3/8” Square Hole** containing:
  - 10/32” x 0.375” pan-head Phillips screws
  - Caged nut adapters for square-holed racks

2.3.1.2
9024-CU, 9020 and 9040

- **Kit Mounting Rails** containing:
  - One pair of bottom support rail assemblies
  - One pair of hat rail assemblies
- **Kit Mounting Hardware 3/8” Square Hole** containing:
  - 10/32” x 0.375” pan-head Phillips screws
  - Caged nut adapters for square-holed racks

2.3.1.3
9080, 9120 and 9240

- **Kit Mounting Rails** containing:
  - One pair (left and right) of bottom support rail assemblies
  - One pair of top support rail assemblies (9240 only)
  - Two heyclips (9080 and 9120)
  - Four heyclips (9240 only)
- **Kit Mounting Hardware 3/8” Square Hole** containing:
  - 10/32” x 0.375” pan-head Phillips screws
  - Caged nut adapters for square-holed racks

2.3.2
Mark the Rack

Allow enough vertical space in the rack for each specific switch installation.

1. Determine the location on the rack of the bottom of the switch.
2. Mark the upper (if applicable) and lower mounting positions on the vertical rails on the front of the rack.
3. Mark the upper (if applicable) and lower mounting positions on the vertical rails on the back of the rack.

NOTE:The front flange of the rail (chassis port side) has two holes, which correspond to the bottom two holes on the front flange.

2.3.3
Install the Rack Mounting Brackets: 9024-FC

1. Install the appropriate mounting bracket to each side of the switch, using three (3) #6-32 flat head screws per bracket

2.3.4
Install the Rack Rails (9024-CU, 9020, 9040, 9080, 9120, 9240)

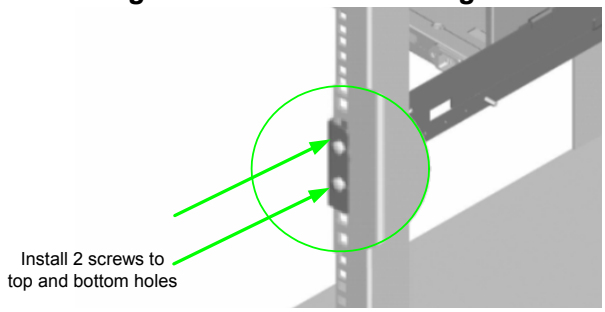
1. Install the caged nuts into the 2 back holes (chassis leaf module side) and the top and bottom holes (chassis fan side) in the front of the rack.

NOTE:The 2 front holes should match up with the *top and bottom* holes of the rail front flange.

All holes should correspond to the rail mounting positions.

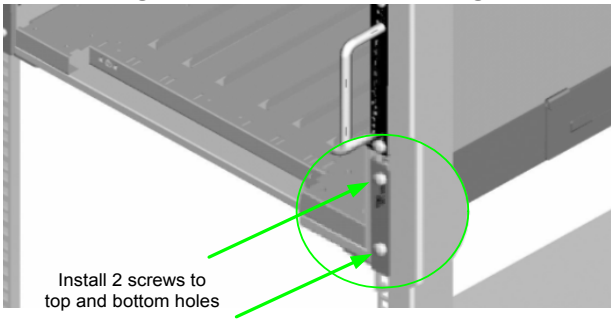
2. Fasten the rail back flange (chassis port side) to the rack by installing two screws into the rail and rack.

Figure 2-1. Rail Back Flange



3. Fasten the rail front flange (chassis fan side) to the rack by installing two screws into the rail and rack.

Figure 2-2. Rail Front Flange



4. Tighten all rail mounting screws.

Install the second rail on the other side of the rack by repeating steps 1 through 3.

2.3.5
Install the Rail Hat Sections (9024, 9020 and 9040)

The 9024, 9020 and 9040 have hat rails that are attached to the sides of the switch and slide into the rack rails.

2.3.5.1
Install the Hat Rails: 9024-CU

NOTE: Make certain to install the hat rails to the correct side of the switch. The switch rails have specific left and right part numbers:

- Left switch rail: #200595
- Right switch rail: #200594

Two additional ways to ensure that the rails are mounted on the correct side(s) of the switch:

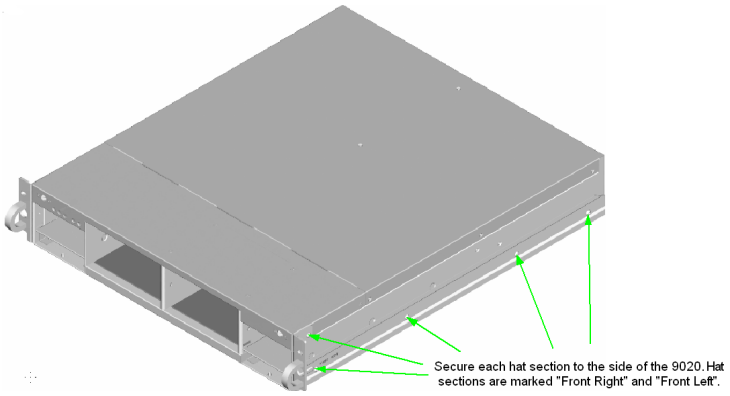
- Make certain that the hat section is always on top

1. Using the provided hardware, attach three (3) recessed-hex screws to the three holes in the rail, and to the corresponding holes in the switch.
2. Repeat for other rail.

2.3.5.2
Install the Hat Rails: 9020

The 9020 has left (marked "Front Left") and right (marked "Front Right") hat rail sections that are attached to the switch with five (5) screws as shown in in figure 2-3.

Figure 2-3. Installing 9020 Hat Rails

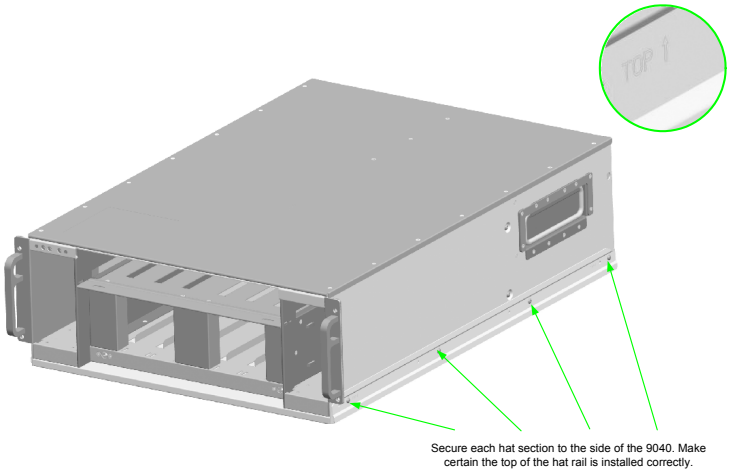


2.3.5.3

Install the Hat Rails: 9040

The hat rails on the 9040 can be used on either side of the switch and are attached with 4 screws. The hat rail has 8 holes: 4 correspond to the left side of the chassis and 4 correspond to the right. When installing the hat rails, make certain that the top of the rail is installed the same on both sides (rail is marked with "TOP") as shown in figure 2-4.

Figure 2-4. Installing 9040 Hat Rails



2.3.6
Rack-Mount the Switch

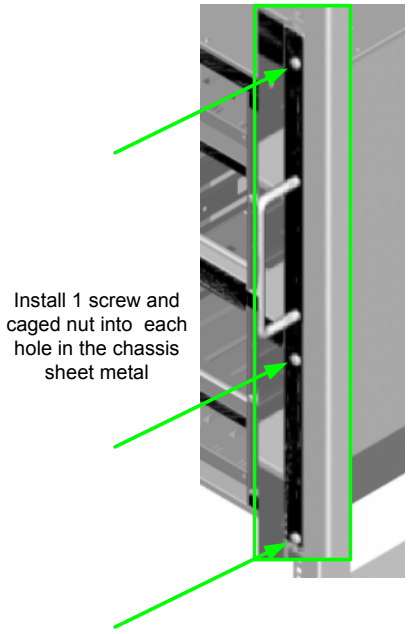
To install the switch into the rack, perform the following steps:

1. Clear the area of any unnecessary materials.
2. Attach the clip of the ESD wristband (strap) to bare metal on the cabinet. Put the wristband around one wrist with the metal button against the skin.
3. Lift the switch and from the front of the cabinet, slide it onto the rails. The fans and power supplies are on the *front* of the chassis; leaf/VIC modules are to the *rear*.

CAUTION! Never lift the switch with the handles on the spine modules, leaf modules, power supplies, and fan trays. These handles are not designed to support the weight of the switches.

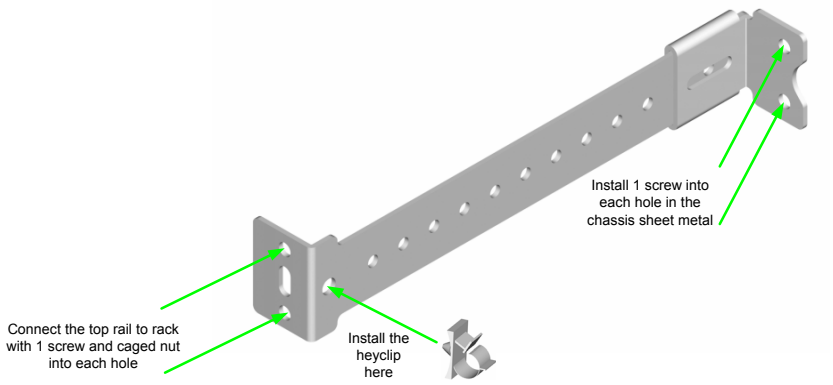
4. On each side of the chassis, install a screw and caged nut for each hole in the chassis sheet metal.

Figure 2-5. Secure the Chassis to the Rack



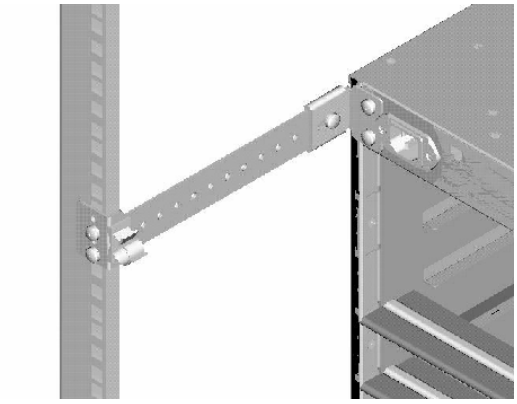
5. (**9240 Only**)Attach the top support rails to the chassis rear side as shown in Figure 2-6:

Figure 2-6. Top Rail Assembly



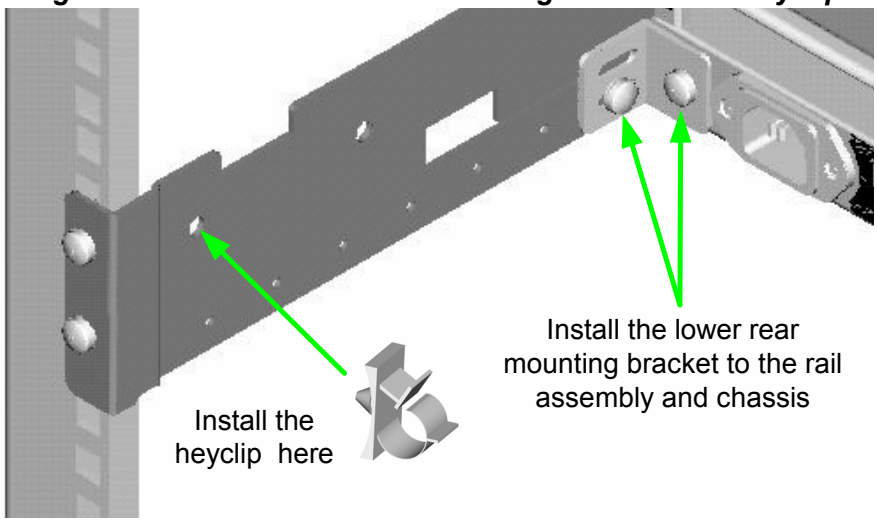
a. When complete, the top rail assembly should look like Figure 2-7:

Figure 2-7. Completed Top Rail Assembly



6. Using two screws, install the lower mounting bracket to the rail assembly and chassis as shown in Figure 2-8.

Figure 2-8. Install the Lower Mounting Bracket and Heyclip



7. Install the heyclip to the rail assembly.
8. If applicable, reinstall the chassis fascia(s).
9. Tighten all screws.

2.3.7 Installing the Switch Fascia

To install the switch fascia(s):

1. On the switch fan side, insert the notches on the top of the fascia into the two slots on the chassis frame. Snap the bottom of the fascia in place.

2.3.7.1 Installing the Modules (9020, 9040, 9080, 9120 and 9240)

NOTE: The purchased configuration for the SilverStorm 9000 is shipped fully populated. Follow these steps when it becomes necessary to install or replace spine modules and leaf modules.

1. Remove the necessary management modules/blanks, spine modules/blanks , leaf modules, virtual I/O cards (VICs) and blanks. For detailed instructions, please refer to the section “Removing a Module or Blank” on page 2-12.

NOTE: If the user is only adding additional modules, remove only the blank(s) for the slot(s) to be populated. These will not be replaced.

2. When placing the spine modules and leaf modules/VICs into chassis slots, the following recommendations apply:
   a. Spine Modules — It is recommended that the spine module(s) be installed into:
      - 9120 and 9240 Lower Hemisphere: Slot 1 for managed. For redundant management, populate slots 1 and 2 with management-capable spines. Use slot 3 for unmanaged.
      - 9240 Upper Hemisphere: Slot 5 for managed. For redundant management, populate slots 5 and 6 with management-capable spines. Use slot 4 for unmanaged.
   b. Leaf Modules/VICs — Modules should be populated beginning with slot 1, then slot 2, then slots 3 through x respectively.
3. To install a module or filler, hold it so that the ejector handles are on the bottom
4. Pull the handles out to extend them. Slide the module into the appropriate slot of the chassis until it makes contact with the backplane. As the module seats in the chassis, the handles will begin to close.
5. Push the handles in to fully close.

NOTE: Be sure that all cards are fully inserted in their respective chassis slots, and that the handles are in the locked position. This prevents accidental removal, provides proper grounding for the system, and helps to seat the bus connectors in the backplane receptacles.

2.3.7.2
Removing a Module or Blank

The handles are self-locking. To unlock, push up on the handles to disengage from the lock notch. Then gently pull the handles out and slide the module out of the slot.

NOTE: If removing, but not *replacing* a module, remember to replace with a module blank. All slots must be either populated with a module or have blanks for EMI and thermal integrity.

2.3.7.3
Connect Equipment to the Ports and Power On the System

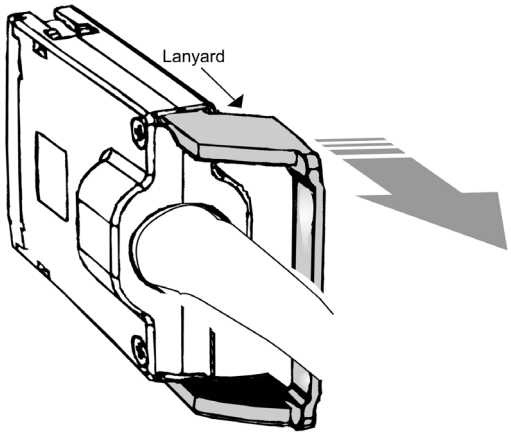
1. Connect a Category 5 or 6 (Cat 5/6) Ethernet cable to one of the RJ-45 connectors on the switch. Connect the other end of the Cat 5/6 to the OOB LAN workstation.
2. Connect the switch to IB-enabled hosts using 4X-to-4X IB or IB/Fiber Optic cables.

NOTE:Make sure all cables latch securely into the corresponding port connectors. If the IB cable connector is not properly oriented to fit onto the port receptacle (i.e., while attempting to insert the cable in the port), *do not* twist the connector to achieve the correct orientation. Instead, reach back a few feet on the cable, and twist the bulk cable to allow the connector to rotate to the proper orientation. Doing this prevents all of the rotational forces from acting right at the connector terminations.

CAUTION! It is important to provide strain relief for the IB cable connector.

NOTE:When handling IB connectors, make certain to remove the connectors by pulling on the *center of the lanyard only* as shown in Figure 2-9. below. Pulling abruptly on the lanyard, or pulling on only one side of the lanyard will prevent the latch/unlatch operation from occurring, and could damage or break the lanyard.

Figure 2-9. 4X IB Cable Connector



3. Connect FVICs to Fibre Channel devices using Fibre Optic cables.

2.3.7.3.1
Connecting Power

1. Provide strain relief for the power cable(s).

   NOTE:Be certain that the power cords are firmly seated into the AC power inlets..

2. If necessary, replace the fascias over the switch fans.
3. Connect the power cables to an AC power outlet.
4. When the switch is plugged into an AC power outlet:

a. The system powers up.

b. The fans start.

c. The system performs a power-on self test (POST).

5. The switch, power supply, and fan LEDs light up.

2.3.7.4
Bringing Up the System For the First Time

2.3.7.4.1
Start-up Procedures

1. Power up the switch.
2. From its flash image on the spine module CMU, the switch begins its boot process.

NOTE:If the spine module RS-232 port is connected to a terminal emulation program, the user will be able to view the switch boot process. Be certain to use a *null-modem/crossover* serial cable for the console port. The settings for the terminal emulation device should be:

- 8 data bits
- no parity bits
- 1 stop bit
- 57600 baud
- Use VT100 emulation.
- Flow control = XON/XOFF

3. Verify the IP address with the command line interface (CLI) command **`showChassisIpAddr`** command. The system returns the information similar to the following:

Chassis IP Address: 192.168.100.9 Net mask: 255.255.240.0

2.3.7.4.2
Changing the Switch IP Address and Default Gateway via the CLI

The command line interface (CLI) can be accessed via Telnet, SSH, or through the switch RS-232 serial ports.

1. Connect null-modem/crossover serial cables to the RS-232 ports of the switch. If using a terminal emulation device, the settings should be:

- 8 data bits
- no parity bits

- 1 stop bit
- 57.6K baud
- Use VT100 emulation.
- Flow control = XON/XOFF

NOTE: If using the RS-232 port, skip to **Step 5**. **Steps 2** through **4** are for those users accessing the switch via Telnet or SSH.

2. If using Telnet or SSH, access the switch with the following command:

   ```
   open 192.168.100.9
   ```

3. The system prompts for a user name. In order to change the IP address and default gateway, the user must be logged in as the administrator. At the prompt enter:

   ```
   admin
   ```

4. The system prompts for a password. At the prompt enter:

   ```
   adminpass
   ```

   The system responds with:

   ```
   Welcome to the <SWITCH> CLI. Type 'list' for the list of
   commands.
   ```

5. To change the switch default IP address enter:

   ```
   setChassisIpAddr -h ipaddress -m netMask
   ```

   where **`-h ipaddress`** is the new IP address in dotted decimal (i.e., xxx.xxx.xxx.xxx) format, and **`-m netMask`** is the new subnet mask in dotted decimal (i.e., xxx.xxx.xxx.xxx) format.

6. To change the switch default gateway IP address enter:

   ```
   setDefaultRoute -h ipaddress
   ```

   where **`-h ipaddress`** is the new default gateway IP address in dotted decimal (i.e., xxx.xxx.xxx.xxx) format.

7. To to exit the CLI enter:

   ```
   logout
   ```

2.3.7.4.3

Updating Management Spine IP Addresses in a Redundant Management Configuration (9080, 9120, 9240)

Each managed spine must have a unique IP address that is different than the chassis IP address of the switch. Therefore, a redundantly-managed switch will have multiple unique IP addresses. For example the 9120 and 9240 IP addresses are:

9012 and 9240 Lower Hemisphere

- Chassis: 192.168.100.9
- Spine 1: 192.168.100.11
- Spine 2: 192.168.100.12

9240 Upper Hemisphere

- Chassis: 192.168.100.10
- Spine 5: 192.168.100.13
- Spine 6: 192.168.100.14

It is necessary for each managed spine to have a unique IP address for the following reasons:

- Unique IP addresses are used when sending syslog messages from a managed spine to a syslog server.
- Gives the user the ability to ping each management spine separately.
- If the IP addresses are not unique, collisions will occur, causing IP operations to fail.

To update the IP address on a managed spine, do the following:

1. Ensure that the spine module is connected to a COM port on a serial terminal device via the RS-232 port.
2. Get to a **`[boot]:`** prompt by following Step a or b.
   a. If the managed spine is running, enter the following command at the console:

      ```
      rebootnow
      ```

   Then press **Enter**.

   b. If the managed spine is not running, power on the switch.
3. When the system displays **`image1`** or **`image2`**, press the **Spacebar** to interrupt the auto load sequence before the counter expires (within 5 seconds).
4. At the **`[boot]:`** prompt type the following:

   ```
   spineip <NEW IP ADDRESS> <GATEWAY IP ADDRESS>
   ```

   Then press **Enter**.

5. At the **[boot]:** prompt enter **reboot**, and press **Enter**. Upon reboot the managed spine will display information similar to the following:

```
Unified BootManager For The T3 Platform.
Image Date: Jan 19 2006, 15:03:31
Checking L2 functionality...
BCM 1125
L2 caches initialized and invalidated
CPU 0 caches initialized
Initialized SMBUS Channels
SPD Checksum ok.
MEM_SEL = 0x00000007
CPU_REV = 0x00000001_112421FF
CPU speed = 400 MHz
IO Bridge 0,1 speed = 133,200 MHz
Memory size = 128 MB
MC1 Configured for 128M SODIMM, CAS=2, 100 MHz
Configured Memory Size = 0x08000000
Channel Interleave Bit = 0
Number of Mem Channels = 1
Testing memory
Memory tests pass
CPU 0 flushing caches
L2 flush complete
Start type = 0xBFC006A0
Jumping to romStart
Initializing HyperTransport bus
HyperTransport initialization completed
rintfMBOX connect interrupt_source=28 vector=62 status=0
PrintfMBOX intEnable status=0
Found Intel Strata Flash 128 MBit (0x8918).
Mounted raw file system on device /image1. (size=6291456 bytes)
Mounted raw file system on device /image2. (size=6291456 bytes)
Mounted raw file system on device /dump0. (size=1048576 bytes)
Mounted flash file system on device /rfa1. (size=2097152 bytes)
```

```
Unified BootManager
[1] image1
[2] image2

CPU: Broadcom BCM1125
VxWorks Version: 5.4

boot device          : icspkg0
processor number     : 0
host name            : home
file name            : /image1
inet on ethernet (e) : <NEW IP ADDRESS>
inet on backplane (b):
host inet (h)        : 192.168.100.1
gateway inet (g)     :
user (u)             : ftp
ftp password (pw) (blank = use rsh): ftp
flags (f)            : 0x0
target name (tn)     :
startup script (s)   :
other (o)            : sbe

Loading package from flash device /image1 ...
BootSystem           = <SWITCH>
BootImage Information:
 Product             = <SWITCH>
 BSP                 = t3
 Version             = 4.1.0.0.9
 Compressed Image Size = 3616523 bytes
 md5                 = 46086777be1b5bae45140a440425b915
 vxWorks Image Type  = loadable
 Computed md5        = 46086777be1b5bae45140a440425b915
 md5 values match!
11088736
elapsed time = 4636 (ticks)
```

```
Starting at 0x80010000...


sysI
REGS
BOOT
Initializing HyperTransport bus
HyperTransport initialization completed
Found Intel Strata Flash 128 MBit (0x8918).
Mounted raw file system on device /image1. (size=6291456 bytes)
Mounted raw file system on device /image2. (size=6291456 bytes)
Mounted raw file system on device /dump0. (size=1048576 bytes)
Mounted flash file system on device /rfa1. (size=2097152 bytes)
Network configuration requested.
cliEnabled=1


sbe0 speed=100 fullDuplex=0 flowControl=0
sbe1 speed=100 fullDuplex=1 flowControl=0
```

NOTE: The command **`spineip`** changes the IP address for **`image1`** and **`image2`** on each managed spine.

2.3.7.5

Enabling 12X Ports (9024 and 9080)

Users can enable 12X ports with the following CLI commands:

- **`ismChassisSet12x`**: Enables all external ports for 12x. This command has the following syntax:

  ismChassisSet12x <enable12xBit>

  The option **`enable12xBit`** can be either **`1`** (enable) or **`0`** (disable).

  For example:

  ismChassisSet12x 1

  enables 12X on all external ports.

  NOTE:Enabling all external ports for 12X may cause some latency issues. It is recommended that users enable 12X only for the specific ports they need.

- **`ismPortSet12x`**: Manually enables ports for 12X on a port-by-port basis.This command has the following syntax:

  ismPortSet12x <portName> <enable12xBit>

Using this command to enable external ports is detailed in the following section.

NOTE: Using any of these commands without a **1** or **0** displays the current values for the port(s).

2.3.7.5.1

Enabling External Ports

Enabling 12X ports is achieved by combining three, 4X ports into a group. With the CLI command **ismPortSet12x**, the user enables each port (one at a time) of a group to create the 12X port. For example, to create a 12X port using ports 16 through 18, do the following:

NOTE: Ports are combined in groups of three, sequentially. For example, each 9024 has the following possible combinations:

- Ports 1 through 3
- Ports 4 through 6
- Ports 7 through 9
- Ports 10 through 12
- Ports 13 through 15
- Ports 16 through 18
- Ports 19 through 21
- Ports 21 through 24

1. Log into the CLI as **admin**.
2. Enable port 16 with the command:

   ismPortSet12x Cable16 1.

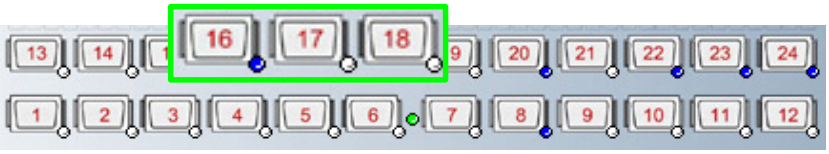
   and press **Enter**.
3. Enable ports 17 and 18 using same command as above, changing the port number each time (i.e., **Cable17**, **Cable18**, etc.).

NOTE: If spaces are used in the **portName** syntax (e.g., **Cable 5**), it must bounded by quotes (i.e., **"Cable 5"**).

4. Reboot the chassis to activate the changes.

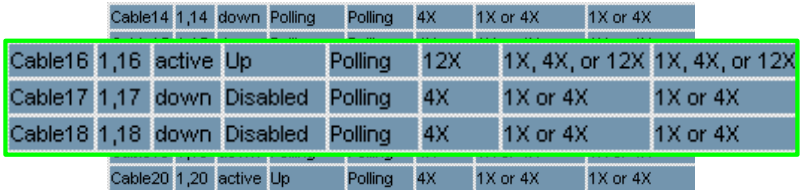
5. Following the reboot, bring up Chassis Viewer. The 12X ports will be displayed as shown in Figure 2-10 where the initial port for the group (port 16) has its LED on. The other ports of the group have their LEDs turned off.

Figure 2-10. 12X Ports Enabled



6. From the 9024 main page, click on the menu buttons **Port Stats/IB Port Stats** to displays the IB Port Statistics screen. The 12X port (for combined ports 16 through 18) is displayed as shown in Figure 2-11:

Figure 2-11. 12X Port Statistics



Cable14	1,14	down	Polling	Polling	4X	1X or 4X	1X or 4X
Cable16	1,16	active	Up	Polling	12X	1X, 4X, or 12X	1X, 4X, or 12X
Cable17	1,17	down	Disabled	Polling	4X	1X or 4X	1X or 4X
Cable18	1,18	down	Disabled	Polling	4X	1X or 4X	1X or 4X
Cable20	1,20	active	Up	Polling	4X	1X or 4X	1X or 4X

The first port of the group (port 16) is shown as **active** and **Up**, while the other two ports in the group are displayed as **down** and **Disabled**.

2.3.7.6
SilverStorm 9000 Component LEDs

2.3.7.6.1
Chassis Status LED

The chassis status LED (one per hemisphere) is **Green** when the system is functioning normally.

The chassis status LED is **Amber** when one of the following conditions exists:

- The system ambient temperature exceeds 52 C but remains less than 60 C.
- Any Fan Alarm is amber.
- Any power supply AC OK LED is off.
- Any power supply DC OK LED is off
- Any spine module Attention LED is on, or it has been determined that a spine is not functioning (even if it is unable to light the LED).

- Any leaf module Attention LED is on, or it has been determined that a leaf is not functioning (even if it is unable to light the LED).

The chassis status LED is **Red** when the system can no longer function properly and indicates one of the following conditions:

- The system ambient temperature exceeded 60 degrees C.
- No functional fan trays are present.
- No functional spines are present.
- No functional leaves are present.

The chassis status LED is **off** when:

- There are no functional power supplies present.
- There are no management cards in the system
- AC power has been removed from the system.

2.3.7.6.2
Subnet Manager Agent (SMA) LED

There is a single SMA LED associated with each hemisphere of the system. This LED is Blue if Fabric Manager license is installed and enabled on this switch or if Subnet Manager is running anywhere else in the fabric.

2.3.7.6.3
RJ45 LEDs

The RJ45 connectors have two LEDs, **Act** and **100**. The **100** LED is **Green** when a 100Mbps link is connected. The **Act** LED is **Green** when an Ethernet link has been established, and blinking when the link is active.

2.3.7.6.4
Fan LEDs

Fan LEDs indicate the following status(es):

- **Green** indicates that the fan is functioning properly.
- **Amber** indicates that the following warning condition exists:
  - A single fan failure when the rotation speed is less than 4000 RPM or greater than 10950 RPM.
- **Red** indicates a possible problem, including:
  - The fan tray is not responding to commands for configuration and temperature-related operations.
  - A fan is not responding to commands for temperature and speed related operations.

- The fan speed has fallen below the minimum allowed RPM for a fan.

Each power supply has two LEDs: DC OK and AC OK. Following are the status definitions for each.

DC OK

- **Green** indicates that DC power is normal.
- **Off** indicates a DC power failure or no DC power is present.

AC OK

- **Green** indicates that AC power is normal.
- **Off** indicates a AC power failure or no AC power is present.

2.3.7.7
Module LEDs (9020, 9040, 9080, 9120 and 9240)

2.3.7.7.1
Leaf Module/FVIC/EVIC IB Port LEDs

Each module IB port has a **Blue** IB link status LED that provide the following indications:

- **On** - the logical link is up (port is in the Active state).
- **Off** - the physical link is down (port is in the Down state).

2.3.7.7.2
Module Status LED

The status LED indicates one of the following conditions:

- Steady **Green** - the module is operating normally.
- Blinking **Green** - LED test state.
- **Off** - module is in the removable state.

2.3.7.7.3
Module Attention LED

The Attention LED indicates one of the following conditions:

- **Off** - the system functioning normally.
- Steady **Amber** - the system requires some attention, which could indicate one of the following conditions:
  - The switch temperature is at a warning level on the module.
  - The switch silicon temperature is at a warning level (approximately 90 degrees C).

- DC voltages on the board are slightly out of tolerance (12V Bulk, 5V, 3.3V, 1.8V, VBIO are all monitored).
- The module can no longer function properly. The system will take the appropriate actions to ensure that no damage is done to its components.

- Blinking **Amber** (once every four seconds) - LED test state.

For each FVIC Fibre Channel port, the Activity (ACT) and Quality (QUAL) LEDs indicate:

Activity (ACT) LEDs:

- Blinks ON for each transmit or receive on the port.

Quality (QUAL) LEDs:

- Constant - no errors.
- Blink slowly - receiver bit errors are detected.
- Blink fast - low signal-to-noise ratio (SNR) close to an error condition.
- Off when an auto-negotiation is in progress or an error condition exists.

2.3.7.8
FVIC Fibre Channel Port LEDs (9020, 9040, 9080, 9120 and 9240)

2.3.7.9
Link/Activity

The green Link/Activity LED will blink indicating

- Fibre Channel IO activity on the port. The LED is off when a link is down.

2.3.7.10
Fault

The Fault LED is a solid Amber LED indicating:

- A fault condition related to the Fibre Channel connection for a specific port. The Fault LED will be on if a problem is detected in either the Fibre Channel controller or in the small form factor pluggable (SFP) optical transceiver for a specific port.

2.3.7.11
EVIC Ethernet Port LEDs (9020, 9040, 9080, 9120 and 9240)

2.3.7.12
Link

The Link LED is a solid Green LED indicating

- That the Ethernet port has successfully established a link. The LED is off when a link is down.

2.3.7.13
Activity (TX/RX)

The Activity LED is a Green LED indicating:

- There is link activity on an Ethernet port. The LED is off when there is no link activity.

2.3.7.13.1
Spine/Management Module Management LEDs

Each spine module has three management LEDs:

- Capable:
  - **Green** indicates that the spine slot supports management.
  - **Off** indicates that the spine slot does not support management.
- Stat:
  - **Green** indicates that a management board is present.
  - **Off** indicates that no management board is present.
- Act:
  - **Green** indicates that management board is in the active mode. In a redundantly-managed system, this would indicate the master spine.
  - **Off** indicates that the management board is in the standby mode (if the STAT LED is **Green**). In a redundantly-managed system, if the Capable LED is also **Green**, this would indicate the slave spine.
- DDR (Spine Module Only):
  - **Green** indicates that the switch is capable of running at DDR speeds.
  - **Off** indicates that the switch is not capable of running at DDR speeds (i.e., SDR only).

2.3.7.13.2
Activating/Deactivating the Embedded Fabric Manager

If the embedded (FM) has been purchased, it requires a license key to activate it via Chassis Viewer. The license key information is contained in an envelope marked "Fabric Manager License". This envelope is packed in the box with the switch. For detailed information on adding a license key, refer to the section "License Keys; Key Administration" in the SilverStorm 9000 Users Guide. For information on activating the Fabric Manager, refer to the section "QuickSilver Fabric Manager Control" in the SilverStorm 9000 Users Guide.

NOTE: For systems with redundant management, the user must add the License Key and start the Fabric Manager for each managed spine in the chassis (each managed spine will have a separate license key). The first spine in each hemisphere to be activated will be the master Fabric Manager, the second will be the slave Fabric Manager.

2.3.7.14
Shut Down Procedures

In order to shut down the switch:

1. Power down the switch by removing the power cords from the AC power inlets.

2.3.8
Hot Swapping Components

2.3.8.1
Hot Swapping Leaf/VIO and Spine Modules

NOTE: Following are the general guidelines for hot swapping leaf and spine modules:

- Hot swap one module at a time, allowing the chassis to completely update it before hot-swapping the next module. The module update is complete when it becomes visible within the Chassis Viewer GUI. Listed below are the approximate times to fully update each module type:
  - Spines modules: up to 4 minutes
  - Leaf/VIO modules: up to 2 minutes

  A general recommendation is to hot swap beginning with leaf modules, then VIO cards, then spine modules with the managed spine(s) being last.
- When a management spine is hot swapped, the rest of the chassis will continue to move packets without interruption.

CAUTION! Be certain that the managed spine to be hot swapped is at the that same firmware level as all other components in the switch. A hot swap of a managed spine with another firmware level will cause a disruptive reboot.

- There is no need to reboot the chassis when replacing either a spine or leaf module.

1. Remove the module by pushing up on the handles to disengage from the lock notch. Once the handles are disengaged, gently pull the handles out and slide the module out of the slot.
2. To install a module, hold it so that the ejector handles are on the bottom.

3. Pull the handles out to extend them. Slide the module into the appropriate slot of the chassis until it makes contact with the backplane. As the module seats in the chassis, the handles will begin to close.
4. Push the handles in to fully close.

2.3.8.2 Hot Swapping the Fan Unit

1. Loosen the captive panel screw.
2. Pull the panel screw down to partially disengage the unit.
3. Slowly pull the unit. The unit will disengage from the connector.
4. Carefully slide the fan out until it is completely removed from its slot.

To install a fan unit:

1. Place the unit into the slot. Slowly slide the fan unit in until it engages into the connector.
2. Using the panel screw, push up to re-engage the unit.
3. Tighten the captive panel screw.

2.3.8.3 Hot Swapping Power Supplies

Power supplies can be hot swapped without powering down the switch. To replace a power supply:

1. Loosen the captive panel screw.
2. Pull the panel screw down to partially disengage the unit.
3. Slowly pull the unit. The unit will disengage from the connector.
4. Carefully slide the power supply out until it is completely removed from its slot.

To install a power supply:

1. Place the unit into the slot. Slowly slide the power supply in until it engages into the connector.
2. Using the panel screw, push up to re-engage the unit.
3. Tighten the captive panel screw.

Appendix A

SilverStorm 9000 Product Specifications

A.1 Physical Specifications

All products within the 9024 and 9000 Multi-protocol Fabric Director series are designed to be installed in industry-standard 19-inch four-post server racks.

Racks should conform to conventional standards. Use the American National Standards Institute (ANSI)/Electronic Industries Association (EIA) standard ANSI/EIA-310-D-92 and International Electrotechnical Commission (IEC) 297. These racks are commercially available in various depths. It is recommended to use rack with minimum of 36" depth to facilitate cable installation and routing. Other physical attributes are shown in the table below.

NOTE: The 9000 series MPFD products should not be installed in two-post telecommunication racks.

Table A-1. 9000 Physical Attributes

Model #	9024	9240	9120	9080	9040	9020
Height (rack units/inches)	1U/1.75"	14U/24.5"	7U/12.25"	7U/12.25"	4U/7"	2U/3.5"
Depth (without cables)	25 3/4" (654mm)					21" (533mm)
Width	17.32" (440mm)					
Max weight (lb./kg.)	20/9	175/80	100/45	90/41	60/27	32/15

A.2 Environmental Specifications

- Operating temperature:

  5° - 45°C at sea level, altitude derating 1°C per 300m to 2,400m

- Non-operating temperature:

  -35°C to 65°C

- Relative humidity (non-condensing):

  Operating 5% - 85%; Non-operating 5% - 90%

A.3 Cooling and Thermal management: 9024-CU

Table A-2. 9024 Product Configurations

Model #	9024
Maximum InfiniBand Ports	24
Fan Trays	2
Power Supplies	2

- Cooling:

  Air cooled with a hot plug fan tray

  Four fans per tray, 40mm, 12VDC

  Front-to-back airflow

  Active thermal performance monitoring switch board via IBML links

- Power Supply:

  Two redundant, hot plug supplies

  90/264 VAC operation

  65W max power per supply

  Input:

  90–264V AC, 47–63Hz, 1 Phase, 2.2A max current at 100VAC

  Inrush Current:

  33A @ 115VAC (25×C cold start)

  16.5A @ 230VAC (25×C cold start)

  Power Factor 0.95

  Two IEC 320 connectors for independent AC inputs

A.4 Cooling and Thermal management (9020, 9040, 9080, 9120, 9240)

All products 9000 MPFD series use the same fan tray modules and share the same thermal management attributes listed below. The quantity of fan tray modules used in each system is defined in the following table:

Table A-3. 9000 Product Configurations

Model #	9240	9120	9080	9040	9020
Maximum InfiniBand Ports	288	144	96	48	22
Maximum Leaf Modules	24	12	8	4	1
Maximum Spine Modules (9040, 9080, 9120, 9240)	6	3	2	1	0
Fan Trays	8	4	4	2	2
Power Supplies	12	6	6	4	2
Management Modules (9020)	0	0	0	0	2

- Fan Tray:

  Hot plug with two axial, brushless, 12V fans per Fan Tray

- Chassis airflow:

  Front-to-back

- Power supply airflow:

  Power supplies intake air from a pressurized chamber inside a chassis and exhaust to the front of a chassis. In the 9020, exhausted air from power supplies is then routed to the back of a chassis through a return duct integrated into a front fascia.

- Thermal management:

  Temperatures of all major heat producing components are continuously monitored by system management modules. Fan speed is monitored and automatically adjusted by system management modules to maintain appropriate temperatures of major heat producing components. Monitoring is performed via a two wire I2C interface to each Fan Tray.

A.5 Power Specifications

All products within the 9000 MPFD series use a common switching power supply. System power attributes are shown in the table below. Power supplies are hot pluggable and N+1 redundant.

Table A-4. System Power Attributes

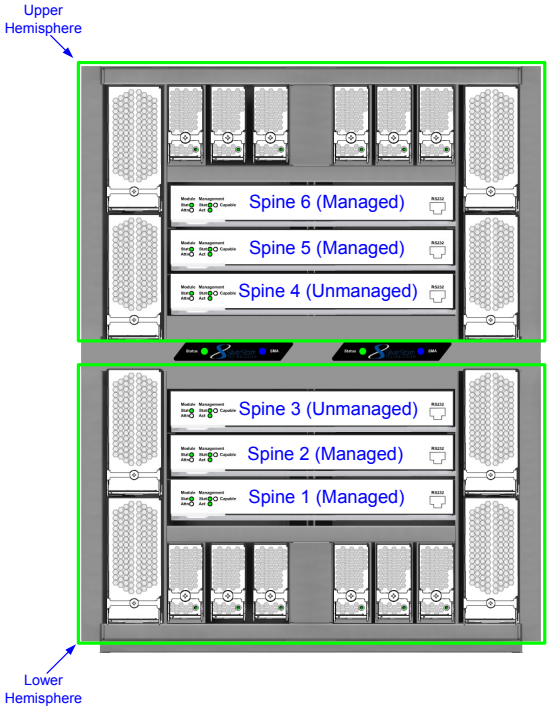
Model #	9240	9120	9080	9040	9020
Maximum # of Power Supplies	12	6	6	4	2
Maximum output per supply	350 Watts				
Input voltage	90-264 VAC autoranging				
Input frequency and phase	50/60 Hz, 1 Phase				
Maximum current per supply	4 Amps				
Power Factor correction	95%				
Power Inlet connector	IEC320-C14				
# of Power Inlets	4	2	2	2	2
Power Cord connector	IEC320-C13				

The 9120, 9080, 9040 and 9020 systems have two independent AC inputs and one common DC output. Each AC input supplies power to half of the power supplies.

In a 9240 system there are two independent DC outputs, which are labeled as hemispheres (see figure A-1). The lower hemisphere is powered by the lower 6 supplies and the upper hemisphere is powered by the upper 6 supplies. There are four independent AC inputs: two in each hemisphere. Each AC input within a

hemisphere supplies AC power to half of the power supplies in a hemisphere, the same as with the 9020 through 9120 systems.

Figure A-1. SilverStorm 9240 Hemispheres



A.6 Configuration Restrictions

The 9000 MPFD series systems are highly configurable. Maximum configurations are shown in Table A-3. Additional configuration restrictions are documented in this section.

The maximum number of Virtual I/O Controllers (VICs) per switch is shown in Table A-5:

Table A-5. Maximum Virtual I/O Controllers

Model #	9240	9120	9080	9040	9020
Maximum number of Virtual I/O Controllers (VICs)	8 (4 per hemisphere)	4	4	4	2

The number of power supplies required to support continuous operation depends upon the system configuration and whether DC and AC redundancy is desired. While DC redundancy is supported for all valid configurations, AC redundancy is limited. The maximum AC redundancy configurations for the 9120 and 9240 are displayed in Table A-6:

Table A-6. 9120 and 9240 per Hemisphere

Model #	**Maximum Configurations: 9120 and 9240 (per hemisphere)**			
	IB only	**IB and EVIC**	**IB, EVIC and FVIC**	**IB and FVIC**
Spine modules	3	3	3	3
IB Leaf modules	12	4	6	8
EVIC	0	4	2	0
FVIC	0	0	2	4

Appendix B

Safety and Regulatory Compliance Information

This section provides regulatory compliance, safety and electromagnetic compatibility (EMC) information for the 9024 and 9000 MPFD series products.

B.1

Safety Information

B.1.1

Statement 1:

Disconnect Device - This unit may have more than one power cord. To reduce the risk of electrical shock, disconnect all power cords before servicing unit.

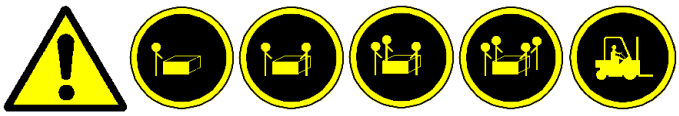
B.1.1.1

Anweisung 1:

Gerät trennen - Diese Komponente verfügt möglicherweise über mehrere Netzkabel. Trennen Sie alle Netzkabel bevor Sie die Komponente warten, um die Gefahr eines elektrischen Schlags zu vermeiden.

B.1.2

Statement 2:



Chassis Lifting - Use safe practices when lifting. Use only the handles provided on the chassis to prevent damage to the chassis and components.

NOTE: Use a team of people appropriate to the weight of each specified product and in conjunction with applicable guidelines. Whenever possible, use a mechanical lift.

B.1.2.1
Anweisung 2:

Anheben des Gehäuses - Lassen Sie Sicherheit beim Anheben des Gehäuses walten. Verwenden Sie nur die am Gehäuse befindlichen Griffe beim Anheben, um Schaden am Gehäuse und den Komponenten zu vermeiden.

ANMERKUNG: Setzen Sie jeweils dem Gewicht jedes angegebenen Produkts und den Richtlinien entsprechend genügend Leute ein. Verwenden Sie, wenn möglich, einen mechanischen Aufzug.

B.1.3
Statement 3:

Energy Hazard - To reduce risk of electric shock, keep hands and fingers out of the power supply bays and backplane areas.

B.1.3.1
Anweisung 3:

Gefahr vor elektrischem Schock - Um der Gefahr vor elektrischem Schock vorzubeugen, halten Sie Hände und Finger den Netzteilschächten und der Rückwand fern.

B.1.4
Statement 4:

Laser Radiation - certain optical products may emit laser radiation. Removing covers could result in exposure to hazardous laser radiation. Radiation may be emitted from connectors or fiber optic cables.

B.1.4.1
Anweisung 4:

Laserstrahlung - manche optischen Produkte geben Laserstrahlung ab. Beim Entfernen der Abdeckungen können Sie möglicherweise gefährlicher Laserstrahlung ausgesetzt werden. Laserstrahlung kann von Anschlüssen oder Faseroptikkabeln abgegeben werden.

B.1.5
Statement 5:

No User Serviceable parts - Hazardous energy levels may be present inside power supplies and circuit card modules. Do not remove covers.

B.1.5.1
Anweisung 5:

Wartung nur durch Fachmann möglich - Gefährlich hohe Stromstärken sind in Netzteilen und in den Modulen der Busleiterplatte vorhanden. Entfernen Sie die Abdeckungen nicht.

B.1.6
Statement 6:

Equipment Installation - Only qualified personnel should be allowed to install, remove or replace chassis or modules.

B.1.6.1
Anweisung 6:

Geräteinstallation - Die Installation, Entfernung oder Erneuerung von Gehäuse und Modulen sollte nur durch Fachpersonal erfolgen.

B.1.7
Statement 7:

Adding or Replacing Modules - These modules are intended only for installation in SilverStorm 9000 Series MPFD base units. Always install blanks when removing an active module. They prevent exposure to energy hazards inside the unit, contain EMI, and maintain cooling air balance in the chassis.

B.1.7.1

Anweisung 7:

Hinzufügen oder Austauschen von Modulen - Diese Module sind für die Installation in MPFD-Grundeinheiten der SilverStorm 9000 Serie vorgesehen. Installieren Sie stets leere Module, wenn Sie ein aktives Modul entfernen. Diese verhindern, dass Stromgefahr im Innern der Einheit entsteht, enthalten Störstrahlung und sorgen für den Kühlungsausgleich im Gehäuse.

B.2 Regulatory Compliance Information

Country or region	Regulatory Compliance Statements
US - FCC	FCC Part 15 Class A This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Canada -ICES	This Class A digital apparatus complies with Canadian ICES-003 Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada
European Directives	Products with the CE Marking are compliant with the 89/336/EEC and 73/23/EEC directives, which include the safety and EMC standards listed.
Japan	この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Type	Regulatory Compliance Standards
Safety	UL 60950-1:2003　CSA C22.2 No. 60950-1-03 IEC/EN 60950-1:2003
EMC	FCC Part 15 Class A[1]. ICES-003 Class A IEC/CISPR 22:1997 & EN55022:1998 Class A + A1:2000, A2:2003 IEC/CISPR 24:1997 & EN55024:1998 Class A + A1:2001, A2:2003 VCCI Class A AS/NZS CISPR 22:2002 Class A EN61000-3-2:2001, EN61000-3-3 A1:2001 EN61000-4-2:2001, EN61000-4-4:2001, EN61000-4-6:2001 EN61000-4-3:2002, EN61000-4-5:2001, EN61000-4-8:2001 EN61000-4-11:2001

[1] For frequencies above 1Ghz, systems require installation in a four-post server rack with front and rear perforated metal doors in order to assure radiated emissions compliance. For detailed information, refer to “Physical Specifications” on page 1.